

DEPARTMENT OF ECOLOGY
Environmental Assessment Program

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SUBJECT: Response to Memorandum from David Milne Dated March 17, 2014

We reviewed the Executive Summary and 39-page report and found multiple errors in interpretation and omissions described below. This memorandum corrects the executive summary statements in ***bold italics***, and supplements the questions and answers available at <http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/qa.html>. There are additional errors in the analysis that are not directly addressed here.

These responses supplement our two responses to similar comments previously submitted. In November 2013, David Milne submitted 20 comments through the South Puget Sound Dissolved Oxygen Study, some relating to the June 2012 report on the Deschutes River, Capitol Lake, and Budd Inlet study (<https://fortress.wa.gov/ecy/publications/SummaryPages/1203008.html>). Responses were included in the South Puget Sound Dissolved Oxygen Study's response to comments. In December 2013, David Milne submitted four questions and comments related to the June 2012 Deschutes River, Capitol Lake, and Budd Inlet study. Several overlapped with comments submitted on the South Sound study. We responded to the December 2013 questions in a memo forwarded to David Milne by Lydia Wagner.

[1] I find that the Lake does not have negative effects on Budd Inlet and that the Lake improves the water quality of the Inlet.

Overall, the Capitol Lake dam has a quantifiable, detrimental impact on Budd Inlet dissolved oxygen concentrations. The negative impact results from the combined effects of circulation in southern Budd Inlet, carbon loading from Capitol Lake, and nitrogen loading from Capitol Lake.

The presence of the dam, independent of any human contribution of nutrients, increases the amount of time that water stays in Budd Inlet (<https://fortress.wa.gov/ecy/publications/SummaryPages/1403021.html>).

The dam releases water from the Deschutes River and Percival Creek as a pulsed flow. Water stays in southern Budd Inlet longer than it does compared with continuous flows from the Deschutes River and Percival Creek without the dam in place. The increase in residence time of the water contributes to lower dissolved oxygen levels in southern Budd Inlet than would occur without the dam in place.

Capitol Lake receives inputs from the Deschutes River and Percival Creek. This results in extensive algae blooms in the lake. Plant growth in Capitol Lake discharges more organic carbon to Budd Inlet than would occur if the Deschutes River and Percival Creek flowed into Budd Inlet directly. As the organic carbon decays, oxygen is used up in the process. This causes lower oxygen levels than would occur without the dam in place.

Capitol Lake does decrease the amount of nitrogen released to Budd Inlet. This has been known since 2004, when the Washington State Department of Ecology (Ecology) developed quarterly reports with interim monitoring data (<http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical.html>). The computer model of Capitol Lake correctly predicts that the water leaving Capitol Lake has much lower nitrogen concentrations than the water entering through the Deschutes River during the growing season. Originally, Ecology hypothesized that this could decrease dissolved oxygen impacts in Budd Inlet, but other factors affect oxygen. The combined effects of the dam (decreased circulation in southern Budd Inlet, higher residence time, higher carbon loading, and lower nitrogen loading) cause greater impacts on dissolved oxygen in Budd Inlet than would occur without the dam in place.

(2) The computer calculations presented are only tangentially relevant to a Lake/Estuary comparison and are presented in formats that are very prone to misinterpretation.

The computer modeling approach was designed specifically to evaluate the relative impact of the lake and estuary alternatives. Ecology worked closely with the Department of General Administration and the Capitol Lake Adaptive Management Plan (CLAMP) Steering Committee to ensure that the modeling conducted as part of Ecology's Total Maximum Daily Load study could be used by CLAMP during the Estuary Feasibility Studies. Ecology's modeling was identified as an in-kind contribution to the General Administration studies.

Computer models are essential tools to determine whether water quality standards are met. The modeling analysis conducted by Ecology was designed to evaluate the contribution of all human influences, including management of the Capitol Lake dam, on potential violations of the water quality standards.

The technical study (<https://fortress.wa.gov/ecy/publications/summarypages/1203008.html>), published in June 2012, presents the information needed to compare with the water quality standards. The report findings were presented at numerous meetings of the Deschutes Advisory

Group, and the report was subject to extensive peer review, including advisory group members and a paid independent review.

(3) All violations of water quality standards reported by the computer are mathematically microscopic and ecologically inconsequential.

This statement is mainly a critique that the water quality standard for dissolved oxygen in Budd Inlet is too stringent. When dissolved oxygen concentrations are naturally low, the dissolved oxygen standards developed by Ecology under the Clean Water Act require no more than a 0.2 mg/L decrease from natural conditions due to the combined effects of all human activities. In Budd Inlet, wastewater discharges alone cause 0.1 to 0.2 mg/L impacts, nonpoint sources alone cause 0.1 to 0.2 mg/L impacts, and sources outside of Budd Inlet cause 0.3 to 0.4 mg/L impacts. However, the presence of the Capitol Lake dam causes the greatest single impact on Budd Inlet dissolved oxygen, deteriorating oxygen concentrations 1 to 2 mg/L, up to ten times as much as is allowed by the water quality standards. For additional information, see

<https://fortress.wa.gov/ecy/publications/SummaryPages/1403021.html>. These changes in dissolved oxygen concentrations are neither microscopic nor ecologically inconsequential.

(4) The TMDL computer simulation data show no water quality problems occurring anywhere at any time throughout Budd Inlet.

This statement is mainly a critique that the water quality standards are too stringent. Computer modeling of dissolved oxygen in Budd Inlet indicates widespread violations of the dissolved oxygen standards. The Capitol Lake dam has the single greatest impact on Budd Inlet dissolved oxygen, and ten times the impact of the LOTT wastewater discharge.

Dr. Milne proposes substituting a threshold dissolved oxygen concentration of 3 mg/L to determine whether a water quality problem occurs instead of using the state's water quality standards found in WAC 173-201A. He suggests that as long as dissolved oxygen is generally above 3 mg/L, there is no water quality problem.

Severe and widespread effects would likely occur below concentrations of 2 to 3 mg/L. However, the scientific consensus also shows that significant biological effects can occur at higher dissolved oxygen levels (for example, <http://www.pnas.org/content/105/40/15452.full>). TMDLs and the water quality standards are intended to provide a margin of safety to prevent water quality conditions causing severe effects.

(5) Data that probably show a beneficial effect of Capitol Lake on all of Budd Inlet have been mistakenly presented as showing a negative effect.

Dr. Milne assumes that the greatest differences in dissolved oxygen were predicted to be near the surface. However, the greatest differences in dissolved oxygen were predicted to be near the bottom. (The last paragraph of his analysis states that if the greatest differences in dissolved oxygen were predicted to be near the bottom instead of near the surface, then the argument in support of comment #5 is not applicable.)

In 2004, Ecology presented interim data in quarterly reports that show lower nitrogen concentrations leaving the lake than entering the lake (<http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical.html>). These were discussed at

numerous meetings of the Deschutes Advisory Group. Subsequent computer modeling indicates that while nitrogen is taken up by plants and sediments within the lake during the growing season, the lake produces much higher loading of carbon to Budd Inlet than would occur with an estuary in place. In addition, the Capitol Lake dam alters the circulation in Budd Inlet. The combined effect is that the lake has a strong detrimental impact on Budd Inlet dissolved oxygen, especially near the bottom where the dissolved oxygen is lowest. For more information, see <https://fortress.wa.gov/ecy/publications/SummaryPages/1403021.html>.

(6) Water exiting Capitol Lake does not go into areas that experience water quality standards violations (East Bay, eg); it flows straight toward the mouth of the Inlet.

This is not correct. We have conducted tracer studies of water leaving Capitol Lake. While much of it flows north past Priest Point Park, some is entrained in an eddy in East Bay. The dam increases the amount of time water remains in East Bay, worsening water quality.

(7) Capitol Lake prevents some 27 metric tons of nitrate nitrogen from entering Budd Inlet every summer—a huge beneficial impact equivalent to the action of two LOTT plants.

While Capitol Lake reduces nitrogen loads to Budd Inlet, it cannot be compared pound-for-pound with the LOTT discharge. Water from Capitol Lake also brings substantially more oxygen-demanding carbon into Budd Inlet than would occur under an estuary alternative. The dam also alters circulation. Capitol Lake dam causes ten times the impact on dissolved oxygen concentrations as the LOTT wastewater discharge.

(8) There are many likely sources of East Bay's water quality standards violations in and near that Bay. The Lake is not one of them.

The Capitol Lake dam exerts the biggest impact on East Bay. East Bay dissolved oxygen concentrations are also influenced by wastewater discharges such as the LOTT outfall and pollution sources in the Deschutes River, Percival Creek, and Indian/Moxlie Creek watersheds. However, the dam has over ten times the impact of any of these sources.

(9) It seems likely that the "baseline" for simulations of the Lake's effects was wrongly calculated. If so, "Lake Scenario" simulation outcomes are not to be trusted.

The baseline was not wrongly calculated. There are numerous errors in this section of the analysis. For example, the analysis states that the South and Central Puget Sound model shows that standards violations are "not ... much different between Lake and Estuary scenarios."

However, the South and Central Puget Sound model was not applied to the estuary alternative. For more information, see Question #8:

<http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/qa.html>.

Cc: Robert F. Cusimano